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Project Title: Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.

PROJECT 1 ABSTRACT
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The overall goal is to release FHB-resistant SRW wheat varieties to ameliorate economic consequences for farmers whose crop is at risk for FHB infection, and for millers, bakers, and consumers who require a safe supply of wheat. The supporting objectives are to: (1) identify new sources of resistance through extensive screening of a diverse set of breeding lines; (2) incorporate resistance through recurrent family selection in populations which are segregating for the Sumai 3 FHB resistance and other quantitative sources of resistance; (3) improve FHB resistance in populations comprising adapted germplasm through simple mass selection, and to advance resistant plants and families through selection into the variety development track; and (4) measure the association between morphological markers and FHB resistance in two wheat populations. The plans to accomplish the project goals are to: 1) conduct extensive field screening in misted nurseries at two locations using scabby corn as inoculum; approximately 727 entries consisting of advanced breeding lines and early generation populations will be screened in misted nurseries at Lexington and Princeton, KY, and 566 lines will be screened in an inoculated (but not irrigated) nursery at Lexington, KY; 2) carry out extensive greenhouse screening using air brush inoculation to mimic field conditions; most entries from the FHB field nurseries noted above will be screened in the greenhouse in this fashion; 3) evaluate F2:4 lines from three populations segregating for Sumai 3 resistance at two locations in misted field nurseries for severity of FHB infection, and harvest seed from the most resistant families and individuals to plant back for the next cycle of selection; these lines will be genotyped with respect to molecular markers linked to the Sumai 3 resistance alleles, and efforts will be made to quantify the magnitude of the non-Sumai resistance; 4) carry out simple mass selection in approximately 50 populations which range from adapted x adapted crosses to crosses with Chinese sources of FHB resistance; minimally blighted spikes will be selected and bulked for two or more cycles of selection until headrowing and purification of inbred lines occurs; and (4) measure several morphological traits such as open flowering, presence of awns, spikelet density, height and others to determine their relationship to FHB resistance in two populations of F4:5 lines previously screened in the greenhouse. The relevance of this project to the U.S. Wheat and Barley Scab Initiative is that breeding FHB-resistant wheat varieties offers the maximum likelihood of success in our effort to minimize the threat of FHB to producers, processors and consumers of wheat.